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(71) Applicant: **Castaldini S.r.L.**
40033 Casalecchio di Reno (IT)

(72) Inventor: **Castaldini, Silvano**
40123 Bologna (IT)

(74) Representative:
Eccetto, Mauro et al
Studio Torta S.r.l.,
Via Viotti, 9
10121 Torino (IT)

(54) Method and unit for stacking articles, in particular paper bags or similar

(57) A method and unit for stacking groups of articles, the method being characterized by including the steps of:

- successively forming a number of groups (13) at an input station (6);
- feeding a group (13) from the input station to a stacking station (27);
- turning the group (13) over in a first direction about an axis (A) of substantially symmetry;
- stacking the group (13) at the stacking station (27);

and so on, turning one group (13) after another over in the opposite direction to the preceding group (13) and the following group (13), so as to form a stack (37) of articles (2) of substantially the same thickness on all sides.

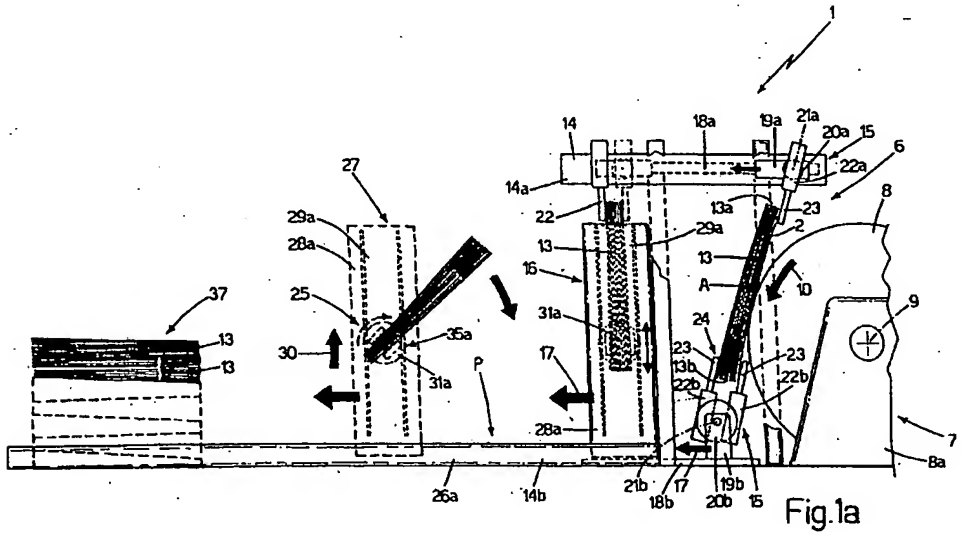

Fig.1a

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Description

[0001] The present invention relates to a method and unit for stacking articles, in particular paper bags or similar.

[0002] In the paper bag manufacturing industry, a unit is used for stacking the bags coming off an automatic bag manufacturing machine, in particular for producing extendable, flat- or square-based paper bags.

[0003] This type of bag is characterized by having, when folded, one thickness at the base and another at the open end, so that only a certain number of bags can be stacked with all the bases facing the same way, without endangering the stability of the stack.

[0004] As a result, such bags are stacked by successively forming a number of groups, each of which has a first end corresponding with the base ends of the bags, and a second end corresponding with the open ends of the bags; and the next stage in the formation of the stack consists in successively stacking the groups so that a first end of a first group corresponds with a second end of a second group, and so on to form a stack of substantially the same thickness on all sides.

[0005] Currently used systems, however, are fairly complex, by requiring a number of cascade-connected devices for forming the bags into groups, and conveying and rotating the groups about an axis perpendicular to the planes of the folded bags, so as to alternate the ends, of different thicknesses, of the groups as described above. All this, of course, takes a good deal of time, and makes straightforward, effective stacking of the groups difficult to control.

[0006] It is therefore a main object of the present invention to provide a method of stacking paper bags or similar, designed to eliminate the aforementioned drawbacks.

[0007] According to the present invention, there is provided a method of stacking groups of articles, each group comprising at least one article, having at least one axis of substantial symmetry, and having a first and a second end opposite each other; the two ends extending substantially parallel to the axis of substantial symmetry and having different thicknesses;

the method being characterized by comprising the steps of:

- successively forming at least a first and at least a second group at an input station;
- feeding the first group from the input station to a stacking station;
- turning the first group over, in a first direction, about the axis of substantial symmetry;
- stacking the first group at the stacking station;
- feeding the second group from the input station to the stacking station;
- turning the second group over, in a second direction opposite the first direction, about the axis of substantial symmetry; and
- stacking the second group in orderly manner onto the first group at the stacking station, so that the first end and the second end of the second group are superimposed on the second end and the first end of the first group respectively.

[0008] It is a further object of the present invention to provide a device for stacking paper bags or similar, designed to implement the above method.

[0009] A number of non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic side view of a preferred embodiment of the unit according to the present invention;
Figure 2 shows a plan view of the Figure 1 unit;
Figure 3 shows a larger-scale view in perspective of a substantially square-based bag in two different configurations;
Figure 4 shows a larger-scale view in perspective of a substantially flat-based bag in two different configurations.

[0010] For a clearer understanding of the accompanying drawings, Figure 1 is divided into Figures 1a and 1b showing two schematic side views of two different portions of the unit according to the present invention (see the plan view in Figure 2).

[0011] Number 1 in Figure 1 indicates as a whole a unit for stacking paper bags 2 or similar, each of which, in the final expanded configuration (Figures 3a, 4a), is substantially cup-shaped and comprises two parallel face walls 3, two parallel lateral walls 4 perpendicular to walls 3, and a bottom wall 5.

[0012] Unit 1 comprises an input station 6 connecting unit 1 to an automatic machine 7 for producing bags 2, and which in turn comprises an output roller 8 fitted to a frame 8a of automatic machine 7 to rotate - with respect to frame 8a and by virtue of a known actuating device not shown - in a given direction 10 (anticlockwise in Figure 1) about an axis 9 perpendicular to the Figure 1 plane.

[0013] Roller 8 feeds bags 2 successively to unit 1 in an initial flattened configuration (Figures 3b, 4b) in which the two face walls 3 are positioned substantially contacting each other, lateral walls 4 are folded inwards along the respective center lines and positioned between walls 3, and bottom wall 5 is folded substantially onto one of walls 3.

[0014] In the initial flattened configuration, each bag 2 is therefore thicker at the closed end 11 (Figures 3b, 4b) than at the open end 12.

[0015] Roller 8 conveys each bag 2 with ends 11 and 12 respectively at the front and rear in direction 10

to form groups 13 of bags 2 at input station 6. Each group 13 comprises a given N number of bags 2, which are all oriented with the thicker ends 11 facing downwards (Figure 1), so that group 13 has two end faces 13a, 13b of different thicknesses. Group 13 also has a substantially horizontal axis A (Figure 1) perpendicular to the Figure 1 plane and parallel to the two faces 13a, 13b.

[0016] Unit 1 comprises a frame 14 having a substantially vertical surface 14a and a substantially horizontal surface 14b; and a pickup device 15 for forming and feeding groups 13 successively to a transfer station 16 and along an initial portion of a given path P extending in a direction 17 substantially parallel to surface 14b. Obviously, a counter (not shown) must be provided at pickup device 15 to count the incoming bags 2 and so form a number of groups 13 all with the same N number of bags 2.

[0017] Device 15 comprises two guides 18a, 18b integral with frame 14, extending parallel to direction 17, and located respectively over and beneath path P; and two powered slides 19a, 19b, each fitted to a respective guide 18a, 18b to slide back and forth in a straight line in direction 17.

[0018] Each slide 19a, 19b supports a respective disk 20a, 20b, which is fitted to respective slide 19a, 19b to oscillate - with respect to slide 19a, 19b and by virtue of a respective known actuating device not shown - about a respective axis 21a, 21b parallel to axis 9. Disk 20b is fitted with two actuating cylinders 22b parallel to each other and to surface 14a, while disk 20a is fitted with one actuating cylinder 22a similar to actuating cylinders 22b (Figure 1).

[0019] Each actuating cylinder 22a, 22b has a respective output rod 23, which is movable between an extracted position, in which rod 23 is substantially located outside respective actuating cylinder 22a, 22b, and a withdrawn position, in which rod 23 is substantially housed inside respective actuating cylinder 22a, 22b.

[0020] Actuating cylinders 22b define a gripping member 24, and are movable with respect to each other - and by virtue of a known actuating device not shown - between a parted position, and a gripping position wherein respective rods 23 grip a respective group 13 of bags 2 at end 13b, i.e. at the closed ends 11 of bags 2. Actuating cylinder 22a is connected integrally to respective disk 20a, and cooperates at station 16 with a fixed actuating cylinder 22 to grip said group 13 at end 13a of group 13, i.e. at the open ends 12 of bags 2 in group 13.

[0021] Unit 1 also comprises a conveying and turnover device 25, in turn comprising two guides 26a, 26b, which are fitted to surface 14b of frame 14, are located on opposite sides of path P, and extend, parallel to direction 17, between transfer station 16 and a stacking station 27 where groups 13 are stacked as described in detail later on.

[0022] Device 25 also comprises two powered slides 28a, 28b fitted to respective guides 26a, 26b to slide, along guides 26a, 26b, back and forth in a straight line along path P in direction 17.

[0023] Each slide 28a, 28b is fitted with a respective guide 29a, 29b, which extends in a direction 30 perpendicular to surface 14b and supports a respective slide 31a, 31b powered to slide in two opposite directions along respective guide 29a, 29b.

[0024] Each slide 31a, 31b supports a respective disk 32a, 32b (Figure 2), which, by means of a respective known actuating device 33, is rotated, with respect to respective slide 31a, 31b, about a respective axis 34a, 34b (Figure 2).

[0025] Each disk 32a, 32b supports a respective gripping member 35a, 35b similar to gripping member 24 of pickup device 15 and comprising a respective pair 36a, 36b of actuating cylinders movable with respect to each other between a parted position and a gripping position.

[0026] In actual use, output roller 8 successively feeds bags 2, in the initial flattened configuration (Figures 3b, 4b), to input station 6 of unit 1, where actuating cylinders 22b are in the parted position, rods 23 of actuating cylinders 22b are in the extracted position, and rod 23 of actuating cylinder 22a is in the withdrawn position to clear the incoming bags 2 from roller 8. At station 6, bags 2 are therefore supported at the bottom by a pair of guides (not shown) extending parallel to direction 17 and located on opposite sides of slide 19b, and are supported at the front, in direction 17, by rod 23 of one of actuating cylinders 22b, and at the rear, in direction 17, by the outer surface of roller 8. Obviously, the N number of bags 2 in each group 13 is counted by a counting device (not shown).

[0027] Once a group 13 comprising said N number of bags 2 is formed, actuating cylinders 22b are moved into the gripping position to grip group 13 at ends 11 of respective bags 2, and rod 23 of actuating cylinder 22a is moved into the extracted position to engage the rear of the newly formed group 13.

[0028] At this point, both slides 19a, 19b are operated simultaneously to transfer group 13 from station 6 to transfer station 16, where actuating cylinder 22a cooperates with fixed actuating cylinder 22 to grip group 13 at end 13a.

[0029] At station 16, group 13 is engaged by gripping member 35a. More specifically, rods 23 of respective actuating cylinders 36a are moved into the extracted position, and actuating cylinders 36a are moved into the gripping position to grip group 13 close to ends 11 of respective bags 2. At this point, rods 23 of actuating cylinders 22a and 22b and of fixed actuating cylinder 22 are moved into the withdrawn position to release group 13, and pickup device 15 is moved back to station 6 to form and pick up the next group 13.

[0030] At the same time, gripping member 35a is transferred to stacking station 27 and simultaneously rotated substantially 90° (clockwise in the example

shown) about respective axis 34a. Finally, at station 27, gripping member 35a places group 13 parallel to surface 14b.

[0031] The above operations are repeated for said next group 13, which is engaged at station 16 by gripping member 35b.

[0032] That is, gripping member 35b engages the next group 13 close to end 13a, and rotates substantially 90° (anticlockwise in the example shown) about respective axis 34b, so that ends 11 of bags 2 are located at the rear in direction 17, and, at station 27, are therefore superimposed on ends 12 of bags 2 in the forgoing group 13. In other words, end 13a of a second group 13 is placed on top of end 13b of a first group 13, and so on to form a stack 37 at stacking station 27.

[0033] This therefore provides for compensating the different thicknesses of ends 11 and 12 of each bag 2, and therefore of ends 13a, 13b of each group 13, and so obtaining a stack 37 of substantially the same thickness on all sides.

[0034] Obviously, as the height of stack 37 varies, this is taken into account by gripping members 35a, 35b releasing groups 13 at different heights.

[0035] All the above operations are controlled, of course, by an electronic central control unit (not shown).

Claims

1. A method of stacking groups of articles, each group comprising at least one said article, having at least one axis of substantial symmetry, and having a first and a second end opposite each other; the two ends extending substantially parallel to said axis of substantial symmetry and having different thicknesses;

   the method being characterized by comprising the steps of:

   - successively forming at least a first and at least a second group at an input station;
   - feeding said first group from said input station to a stacking station;
   - turning said first group over, in a first direction, about said axis of substantial symmetry;
   - stacking said first group at said stacking station;
   - feeding said second group from said input station to said stacking station;
   - turning said second group over, in a second direction opposite said first direction, about said axis of substantial symmetry; and
   - stacking said second group in orderly manner onto said first group at said stacking station, so that said first end and said second end of the second group are superimposed on said second end and said first end of the first group respectively.

2. A method as claimed in Claim 1, wherein said step of turning over each said group is performed in the course of said step of feeding each said group between the input station and the stacking station.

3. A method as claimed in one of the foregoing Claims, wherein the end of said turnover step coincides with the start of said stacking step at said stacking station.

4. A method as claimed in one of the foregoing Claims, wherein said first group is engaged, to perform said turnover step, by first gripping means at a first height with respect to a reference surface, and said second group is engaged, to perform said turnover step, by second gripping means at a second height with respect to said reference surface.

5. A unit (1) for stacking groups (13) of articles (2), each group (13) comprising at least one said article (2), having at least one axis (A) of substantial symmetry, and having a first (13a) and a second (13b) end opposite each other; the two ends (13a, 13b) extending substantially parallel to said axis (A) of substantial symmetry and having different thicknesses;

   the unit (1) being characterized by comprising:

   - an input station (6) and a stacking station (27);
   - means (15) for successively forming at least a first and at least a second group (13) at said input station (6);
   - means (15, 25) for feeding said first group (13) from said input station (6) to said stacking station (27);
   - means (25) for turning said first group (13) over in a first direction about said axis (A) of substantially symmetry;
   - means (25) for stacking said first group (13) at said stacking station (27);
   - means (15, 25) for feeding said second group (13) from said input station (6) to said stacking station (27);
   - means (25) for turning said second group (13) over in a second direction, opposite said first direction, about said axis (A) of substantial symmetry; and
   - means (25) for stacking said second group (13) in orderly manner onto said first group (13) at said stacking station (27); said first (13a) and said second (13b) end of the second group (13) being superimposed on said second (13b) and said first (13a) end

of the first group (13) respectively.

6. A unit (1) as claimed in Claim 5, and also comprising a transfer station (16) located between said input station (6) and said stacking station (27); said means (15, 25) for feeding said groups (13) between the input station (6) and the stacking station (27) comprising first conveying means for feeding said groups (13) between said input station (6) and said transfer station (16), and second conveying means (25) for feeding said groups (13) between said transfer station (16) and said stacking station (27).

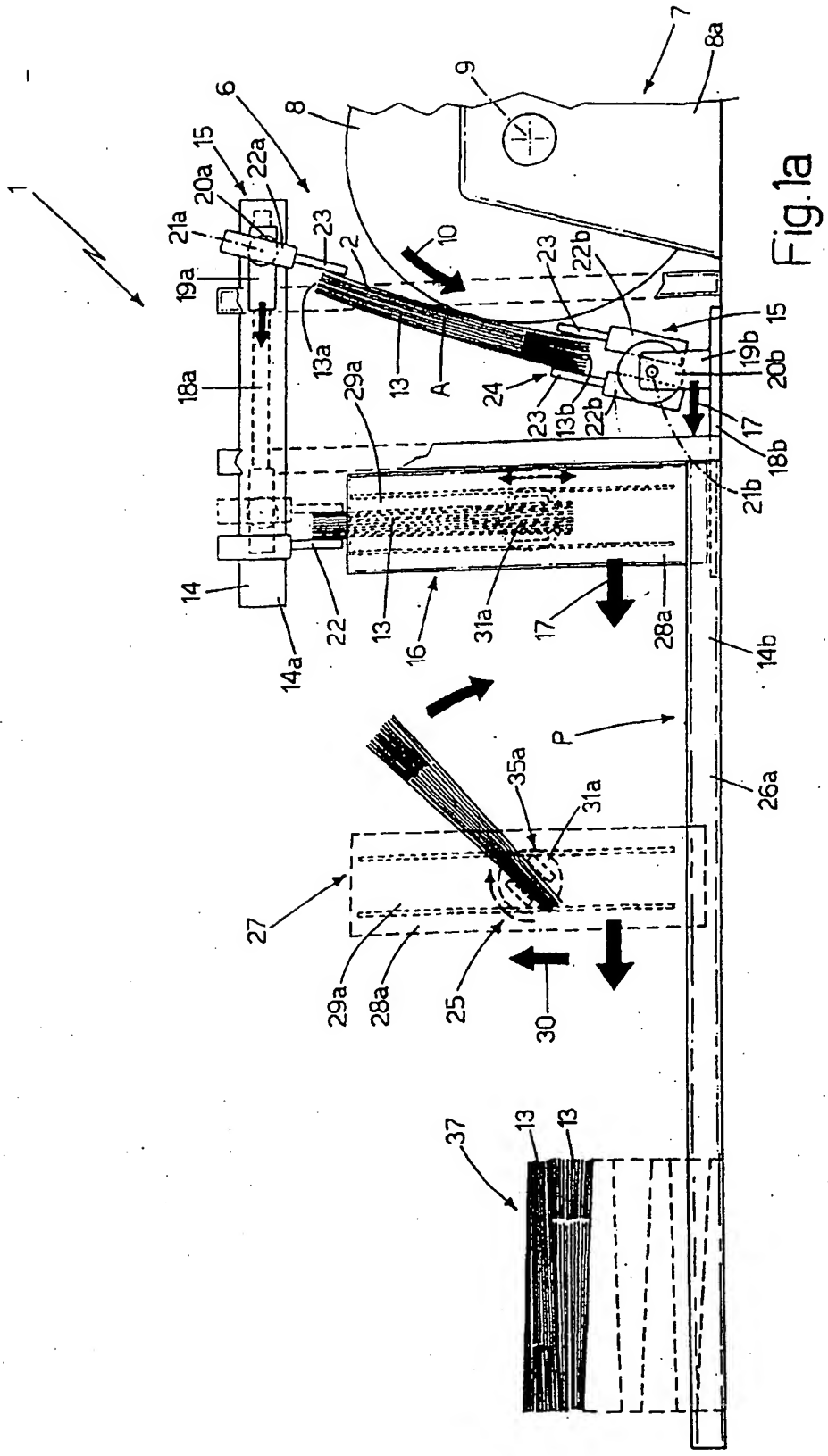
7. A unit (1) as claimed in Claim 6, wherein said second conveying means comprise turnover means (25) for turning said groups (13) from a substantially vertical position to a substantially horizontal position.

8. A unit (1) as claimed in Claim 5, wherein said means (15) for successively forming at least a first and at least a second group (13) at said input station (6) comprise a top slide (19a) having at least one actuating cylinder (22a) equipped with a respective rod (23); and a bottom slide (19b) having at least two actuating cylinders (22b), each equipped with a respective rod (23).

9. A unit (1) as claimed in Claim 6, wherein said second conveying means (25) for feeding said groups (13) from said transfer station (16) to said stacking station (27) comprise two first slides (28a, 28b) which slide along respective guides (18b) to and from said stacking station (27) in a first direction (17).

10. A unit (1) as claimed in Claim 9, wherein each of said first slides (28a, 28b) is fitted with a respective second slide (31a, 31b) which slides in a second direction (30) perpendicular to said first direction (17).

11. A unit (1) as claimed in Claim 10, wherein each of said second slides (31a, 31b) has a respective gripping member (35a, 35b) for gripping and turning said groups (13) of articles (2) over from a substantially vertical position to a substantially horizontal position.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2
6
7
8
8a
9
10
13
13a
14
14a
14b
15
16
17
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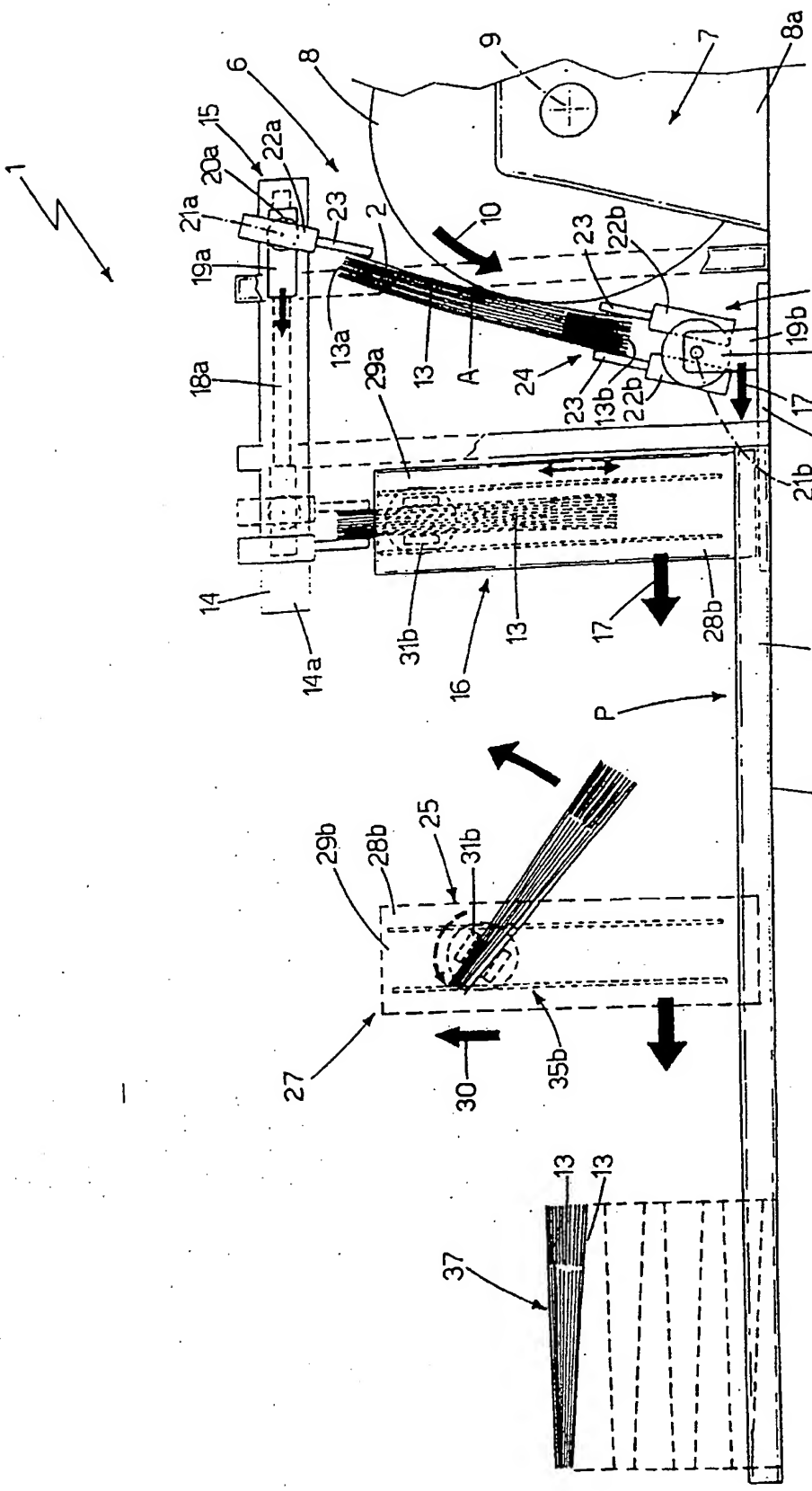
19b
20a
20b
21a
21b
22a
22b
23
24
25
26a
27
28a
29a
30
31a
35a
37
A
P

Fig.1a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8a
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13a
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14b
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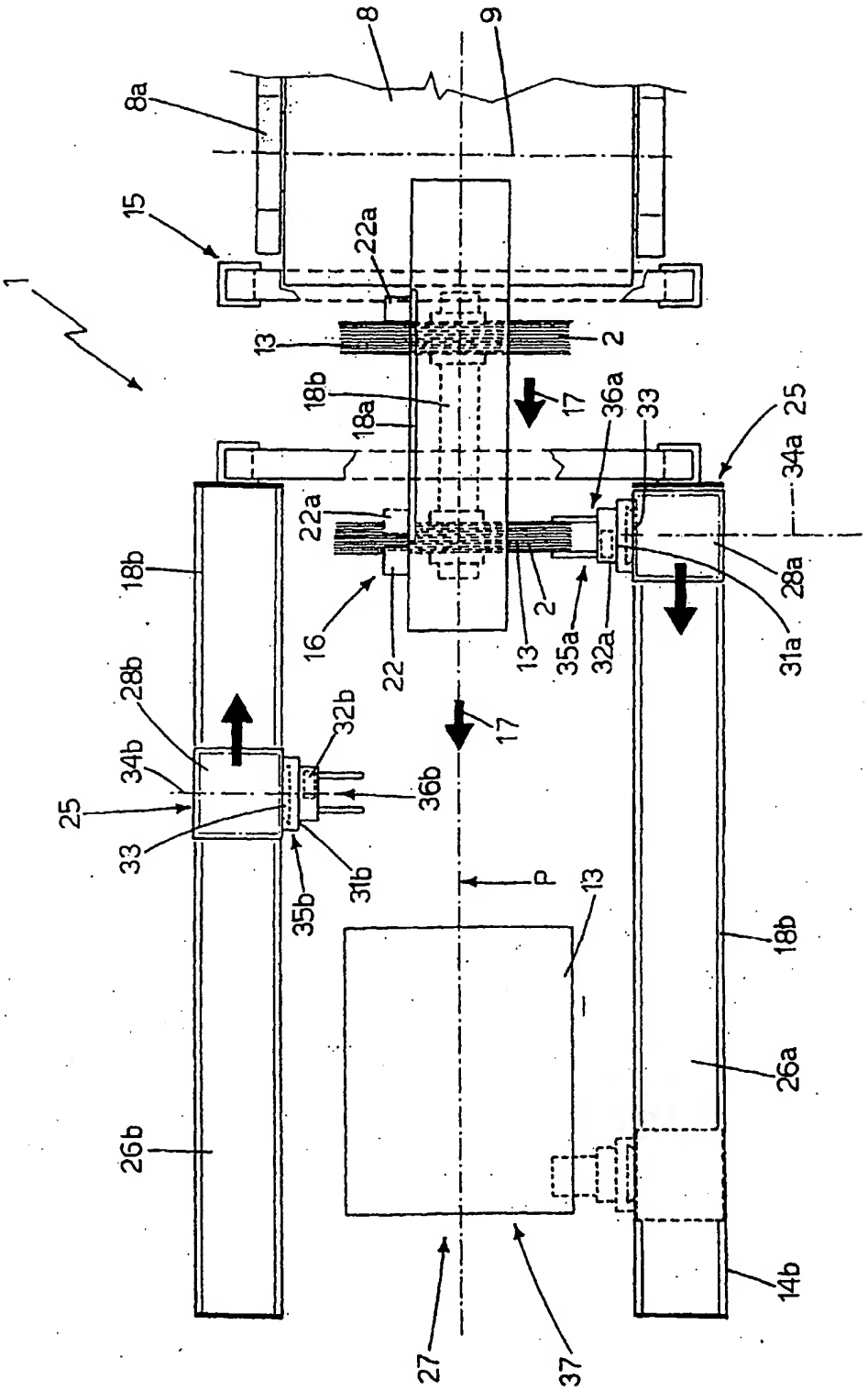
19a
19b
20a
20b
21a
21b
22a
22b
23
24
25
26b
27
28b
29a
29b
30
31b
35b
37
A
P

Fig.1b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9
8a
15
22a
1
13
2
18b
18a
17
36a
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28a
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22
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2
35a
32a
31a
28b
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13
18b
26a
26b
14b
27
37

Fig.2

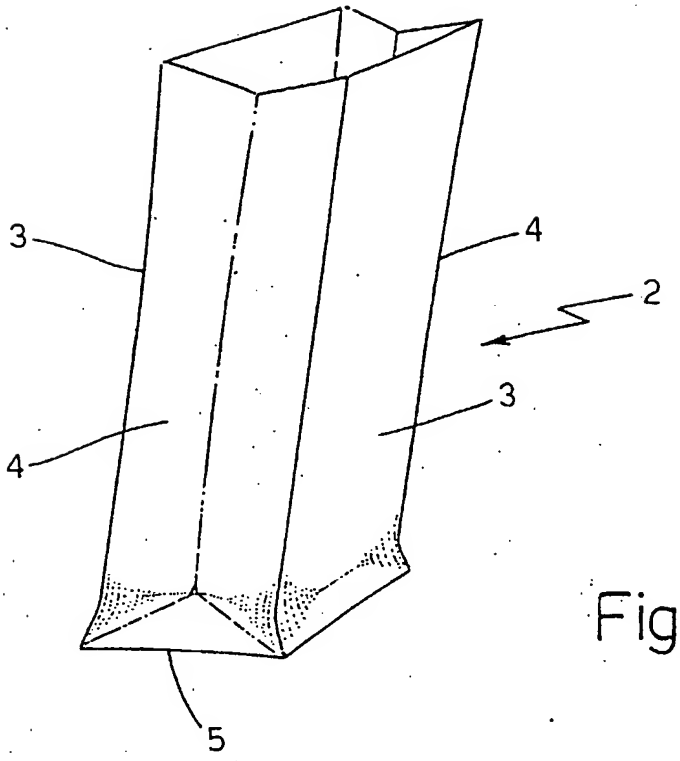

Fig.3a

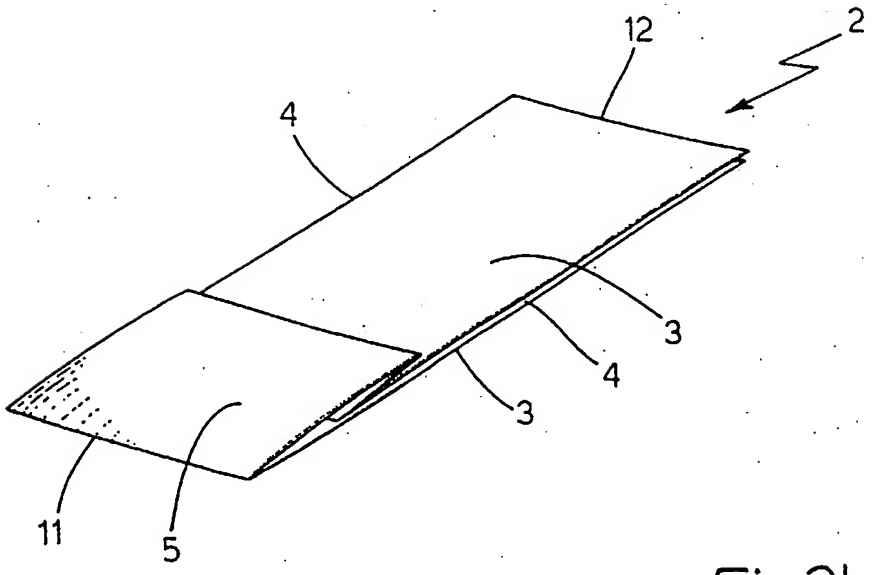

Fig.3b

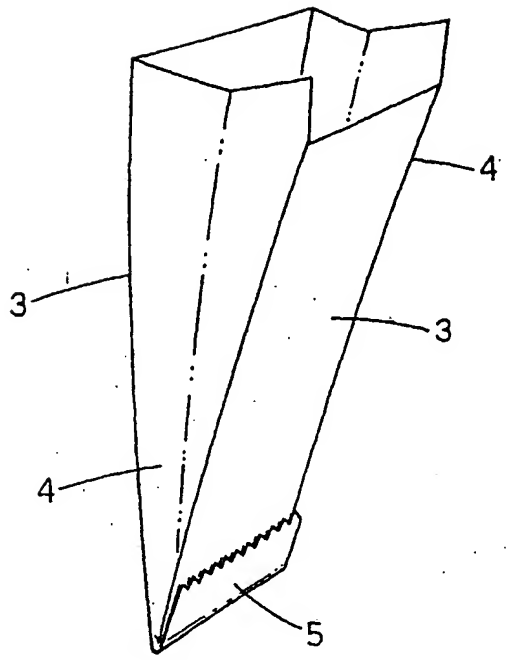

Fig.4a

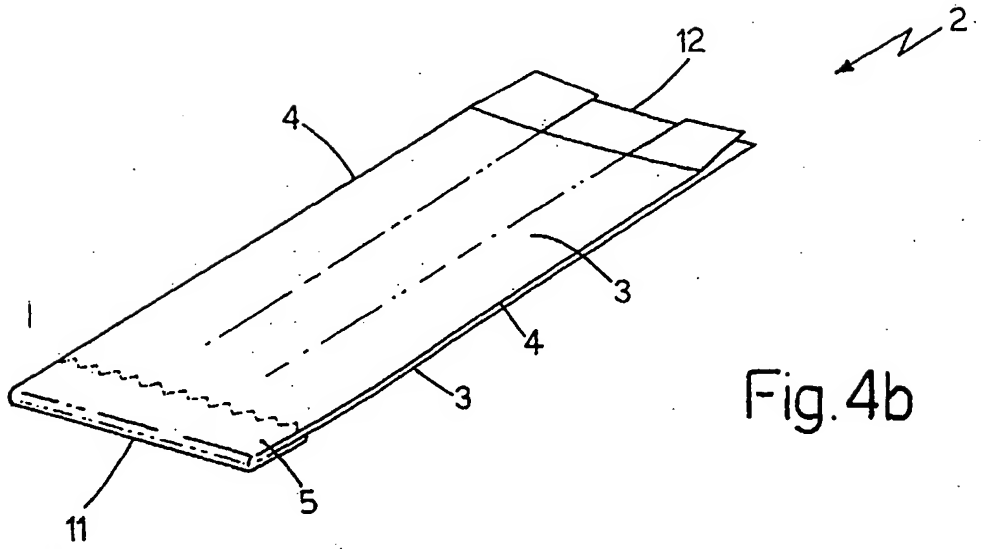

Fig.4b